guide wire for the ICUS catheter. Sites with less than 50% luminal stenosis by ICUS, were studied. Recordings were done for ten cycles before and after 300 mg of intracoronary nitroglycerine (IC-NTG). Electrocardiographic tracings recorded simultaneously with ICUS images were used for timing. Vessel area (VA = area within the media-adventitia border), lumen area (LA = area within the luminal-intima border) systolic and diastolic, and coronary artery distensibility (DIST) were measured, DIST = [2 × dLA/(PP × LA)] × 100, dLA = systolic-diastolic lumen area, PP = intracoronary pulse pressure, LA = lumen area. *Results:* Pts with CAD + DM had smaller LA, (CAD = 12.5 ± 1.5 mm^2, CAD + DM = 9.5 ± 2.1 mm^2, p = 0.05) and dLA and DIST were significantly lower in pts with CAD + DM after IC-NTG. (CAD dLA = 0.94 ± 0.31 mm^2, CAD = DM dLA = 0.76 ± 0.27 mm^2, p = 0.04 CAD DIST = 0.7 ± 0.1 $mmHg^{-1}$ × 100, CAD + DM DIST = 0.24 ± 0.1 $mmHg^{-1}$ × 100, p = 0.05. Degrees of circumference involved, and plaque composition were similar in both groups. *Conclusions:* The presence of diabetes mellitus in patients affected with coronary atherosclerosis impairs coronary vasodilatory response to IC-NTG and reduces coronary artery distensibility.

942-134 Impact of Coronary Artery Remodeling on Clinical Manifestations of Patients with De Novo Coronary Artery Lesions

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The aim of this intravascular ultrasound (IVUS) study is to examine if there is a difference in the degree of compensatory enlargement between the coronary *lesions* of patients with stable angina pectoris and acute coronary syndromes. *Methods:* Twenty two patients with significant de novo coronary artery lesions (≥75% diameter stenosis by angiography) were divided into 2 groups; group S with stable exertional angina pectoris (n = 10) and group U with unstable angina or acute myocardial infarction (n = 12). The culprit lesions of these patients were imaged by IVUS (Boston Scientific 3.5 or 3.0 Fr, 30 MHz imaging catheters and an HP Sonos Intravascular imaging console) before the interventional procedures. The vessel cross-sectional area (CSA) and lumen area were measured, and the wall area (WA, CSA – lumen area) was calculated at the lesion site and proximal reference site.

Results: The lesion CSA, lesion CSA ratio to the proximal reference CSA and lesion WA were significantly larger in group U than in group S (20.7 ± 6.3 vs 15.1 ± 5.6 mm^2, 1.28 ± 0.43 vs 0.90 ± 0.20 and 17.6 ± 6.0 vs 12.3 ± 5.4 mm^2, respectively, $p < 0.05$). This frequency of coronary arteries with larger CSA at the lesion site than the proximal reference site was significantly higher in group U than in group S (8/12 vs 2/10, $p < 0.05$).

Conclusions: 1) Unstable coronary episodes were associated with coronary lesions with a greater wall area and prominent compensatory enlargement. 2) Our findings suggest that the coronary artery lesions with a greater degree of compensatory enlargement are at risk for an acute coronary syndrome presumably because of the larger amount of plaque volume.

942-149 Coronary Collateral Steal Demonstrated Using Intracoronary Doppler Guidewires

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Coronary steal is defined as a fall in blood flow to a certain vascular region in favor of another supply area during arteriolar vasodilatation, i.e. a coronary flow velocity reserve (CFVR) < 1. The purpose of the present study was to determine the frequency of steal in patients (pts) with a wide range of collateral (coll) supply to a vascular area of interest, and to assess whether steal is associated with the amount of coll flow to this area. Fifty pts (age 57 ± 9 yrs) with a coronary artery stenosis to be dilated were examined using 0.014″ intracoronary Doppler guidewires. An adenosine-induced CVFR < 1 (12–18 μg i.c.) obtained distal to the stenosis during 3–4 consecutive measurements was defined as steal. An index for coll flow was determined by positioning the Doppler wire in the coll dependent vessel distal to the stenosis, and by measuring flow velocity time integral *during* ($V_{i_{occl}}$, cm) and *after* ($V_{i_{\phi\text{-}occl}}$) balloon occlusion. $V_{i\_occl}/V_{i\_\phi\text{-}occl}$ was determined without and with i.v. adenosine (140 μg/kg/min). Coll were also graded angiographically according to Rentrop's classification.

	Steal	No Steal	P
n	6/50 (12%)	44/50 (88%)	
Age (yrs)	50 ± 5	57 ± 9	0.07
ECG ST-changes during occlusion	33%	64%	0.16
Angiographic coll grade (0–3)	2.2 ± 0.7	1.0 ± 0.9	0.004
$V_{i\_occl}/V_{i\_\phi\text{-}occl}$ • ϕ adenosine	0.66 ± 0.29	0.31 ± 0.21	0.001
• adenosine	0.37 ± 0.25	0.32 ± 0.29	NS

Conclusions: (1) Coronary steal assessed by intracoronary Doppler flow velocity measurements occurs in approximately 12% of pts showing a wide range of coronary collaterals to the vascular area from where blood flow is redistributed. (2) In this study, there is a strong, direct association between the presence of steal away from and the amount of collateral flow to the region under investigation. (3) Collateral flow to the vascular region studied decreases by almost 50% under conditions of maximal arteriolar vasodilatation using adenosine. (4) This indicates a mechanism of steal via the extensive collaterals and not via local redistribution (i.e. branch steal).

942-150 Fractional vs. Coronary Flow Reserve: Comparison of Guidewire-based Measurements of Coronary Stenosis

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Fractional flow reserve (FFR; mean distal coronary pressure [P_d] ÷ mean arterial pressure [P_a] at peak hyperemia) has recently been advocated as an accurate measure of epicardial coronary stenosis. Previous validation studies comparing FFR and velocity-based coronary flow reserve (CFR) have relied on quantitative angiography as the standard measure of stenosis severity. To more precisely define the relationship between FFR, CFR and stenosis severity we utilized a variable occlusion, canine coronary model in which cross-sectional areas were directly measured with intravascular ultrasound. Incremental lesion severity was achieved with a cuff occluder in the circumflex artery for a total of 11 stenoses in three animals. FFR was determined using two prototype pressure guidewires (Scimed/Boston Scientific and Radi); CFR was measured using Doppler guidewires. Comparison of FFR measurements between the two pressure wires showed significant correlation (R = 1; $p < 0.0001$). Percent area stenosis (%AS) was defined as [minimum lumen area (MLA) ÷ proximal reference area] * 100 ($\%AS_{prox}$) or [MLA ÷ (average proximal + distal reference area] * 100 ($\%AS_{ave}$) Correlations were as follows (*$p < 0.05$; †$p < 0.01$; ¶$p < 0.001$):

Wire	MLA	% AS_{prox}	% AS_{ave}
FFR	R = 0.91¶	R = 0.87†	R = 0.84†
CFR	R = 0.2	R = 0.68*	R = 0.43

Conclusion: In this model FFR correlated more closely than CFR with stenosis severity, expressed either as an absolute or relative values. These results suggest that FFR may provide a more discriminating index of epicardial stenosis.

942-151 Effect of Atherosclerotic Plaque Topography on Coronary Artery Remodeling: An Intravascular Ultrasound Study

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Compensatory enlargement of coronary arteries has been shown to be a protective mechanism against lumen encroachment by atherosclerosis. The role of plaque topography in governing this remodeling process is unknown. We studied 58 diseased segments with paired proximal reference segments in 55 patients with IVUS obtained either pre-intervention or after coronary stenting. Total vessel area (VA), lumen area (LA), plaque area (PA = VA – LA), percent plaque area (P% = (PA/VA) × 100) were measured at both diseased and reference sites. The change in vessel area (ΔVA), change in plaque area (ΔPA), and remodeling index (R.I. = ΔVA/ΔPA) for each pair of segments were calculated. At the diseased sites, angle of non-diseased intima (Angle) and arclength of non-diseased intima (Arc) were also obtained. Lesions with an arc of disease-free intima (n = 30) were classified as eccentric and lesions circumferentially involved with plaque (n = 28) were classified as concentric. In the eccentric cases, R.I was 0.37 ± 0.35 (n = 23) for lesions with P% < 55% and 0.67 ± 0.10 (n = 7) for those with P% > 55% (p = 0.0010). R.I. correlated negatively with Angle (r = 0.330, p = 0.0746) and Arc (r = 0.293, p = 0.1163). In the concentric cases, R.I. was 0.65 ± 0.57 (n = 15) for lesions with P% ≤ 55% and 0.35 ± 0.31 (n = 13) for those with P% > 55% (p = 0.0960).

Conclusion: Eccentric plaques exhibit the lowest remodeling indices when a large arc of disease-free intima is present and show increased remodeling to compensate for plaque accumulation over 55%. Concentric plaques exhibit the highest remodeling indices when P% < 55% and show lower indices when P% > 55%. Disease-free intima may have preserved vasomotion and thus the vessel may compensate for increased shear stress by vasodilation rather than remodeling.